

CLAIMS

- 5 *Sub A1*
1. Porous composite product, characterized in that it is formed of a polymeric material and at least 20% of one or more fillers and in that the said product is capable of being obtained by extrusion.
  - 10 *Inher*  
2. Porous composite product according to Claim 1, characterized in that it exhibits a high specific surface.
  3. Composite product according to Claim 1 or 2, characterized in that the mean diameter of the pores is less than 0.5  $\mu\text{m}$ .
  - 15 *Sub B1*  
4. Composite product according to Claim 1, characterized in that the polymeric material comprises elastomers or polymers chosen from the group consisting of polyolefins, ~~which are optionally~~ *polyolefins* fluorinated acrylic polymers, aromatic polymers, polyamides, polyimides, vinyl polymers with a high proportion of ethyl monomers and ~~optionally~~ thermoplastic polymers or elastomers, soluble in polar organic solvents or water, which remain after the implementation of the manufacturing process.
  - 20 5. Composite product according to Claim 4, characterized in that the polymeric material comprises elastomers or polymers chosen from the group consisting of polyethylenes, polypropylenes, ethylene- $\alpha$ -olefin copolymers and optionally thermoplastic polymers or elastomers, soluble in polar organic solvents or water, which remain after the implementation of the manufacturing process.
  - 30 6. Composite product according to either of Claims 4 and 5, characterized in that the thermoplastic elastomers, soluble in polar organic solvents or water, which remain after the implementation of the manufacturing process are chosen from polyethers, poly(vinyl alcohol)s or ethylene-vinyl alcohol copolymers, preferably polyethers with a molecular mass of between 200,000 and 1,000,000.

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7. Composite product according to Claim 6, characterized in that the composite product comprises:

- 10 to 40% of polyolefin,
- 5 to 40% of polyether,
- fillers, q.s. for 100%.

8. Composite product according to Claim 1, characterized in that the filler is chosen from fillers with a high specific surface, composed in particular of active charcoal, inorganic particles or metallic particles.

9. Composite product according to Claim 8, characterized in that the filler exhibits a specific surface of between 300 and 3000 m<sup>2</sup>/g.

10. Composite product according to one of the preceding claims, characterized in that it comprises between 30% and 90% by weight of filler.

11. Composite product according to Claim 10, characterized in that it comprises 50 to 85% by weight of filler.

12. Composite product according to one of the preceding claims, characterized in that it exhibits a "BET" specific surface of greater than 10 m<sup>2</sup>/g, preferably of greater than 20 m<sup>2</sup>/g.

13. Composite product according to one of the preceding claims, characterized in that it is provided in the form of a film.

14. Composite product according to Claim 13, characterized in that the product in the form of a film exhibits a tensile strength at break of greater than 4 Mpa, preferably of greater than 6 MPa.

15. Composite product according to one of Claims 1 to 12, characterized in that it is provided in the form of granules.

16. Process for the preparation of a porous composite product according to one of Claims 1 to 15, characterized in that: -

- a) a homogeneous mixture comprising one or more insoluble polymers, one or more soluble or

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calcinable polymers and one or more fillers, in particular with a high specific surface, is formed,

b) the said mixture is extruded, so as to form an extruded precursor product,

5 c) the soluble or calcinable polymer or polymers is/are removed from the extruded precursor product, in order to form pores,

d) the porous composite product is recovered.

10 17. Preparation process according to Claim 16, characterized in that the removal of stage c) is carried out by bringing the extruded precursor product into contact with an appropriate solvent.

15 18. Preparation process according to Claim 17, characterized in that the removal of stage c) is carried out by subjecting the extruded precursor product to a calcination.

20 19. Preparation process according to Claim 16, characterized in that stage a) is carried out by means of a mixer or of a twin-screw extruder, ensuring homogeneous mixing of the polymers and of the fillers, in particular with a high specific surface.

25 20. Preparation process according to one of Claims 16 to 19, characterized in that the insoluble polymer/soluble or calcinable polymer ratio by weight is between 0.1 and 5.

30 21. Extruded composite precursor product of use in particular in carrying out the process according to one of Claims 16 to 19, comprising one or more insoluble polymers, one or more other soluble or calcinable polymers and one or more fillers, in particular with a high specific surface.

35 22. Electrode for an electrochemical assembly, such as an electrochemical generator or accumulator, characterized in that it is formed of a film of porous composite product according to Claim 13 or 14 with an electrochemical capacity of greater than 2 F/g, preferably of greater than 10 F/g, and of an electrochemically active material.

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23. Electrode for a supercapacitor or capacitor, characterized in that it is formed of a film of porous composite product according to Claim 13 or 14, characterized in that the electrochemical capacity is  
5 greater than 2 F/g, preferably greater than 10 F/g.

24. Electrochemical assembly, in particular an electrochemical generator, capacitor or supercapacitor comprising two electrodes according to Claim 22 or 23 and a separator impregnated with an electrolyte.

10 *Sub* 25. Application of the composite products according to either of Claims 13 and 14 for the electrochemical storage of energy.

15 26. Application of the composite products according to either of Claims 13 and 14 for packaging or insulation.

27. Application of the composite products according to one of Claims 1 to 12 and 15 for selective filtration.

20 28. Application of the composite products according to either of Claims 13 and 14 for electrodialysis or capacitive deionization processes.

29. Application of the composite products according to either of Claims 13 and 14 for the electrolysis process.

*ADD A5*

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